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SOME TERTIARY MOLLUSKS FROM SOUTHERN FLORIDA

BY

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United States Geological Survey

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INTRODUCTION

The interesting molluscan fauna upon which this paper is based was received from Herman Gunter, State geologist of Florida, who kindly gave me permission to study it. The author expresses his sincere thanks to Mr. Gunter for the opportunity to study this fauna and to Mr. G. M. Ponton, assistant geologist of the Florida Geological Survey, for furnishing J. H. C. Marten's description of the locality and section, and to officials of the United States National Museum; to Dr. Henry A. Pilsbry, of the Academy of Natural Sciences of Philadelphia; and to Mr. Carl Boyer, director of the Wagner Free Institute of Science, Philadlephia, for the opportunity to compare specimens with their collections.

The photographs used for illustrations in this paper were made in the laboratory of the United States Geological Survey by W. O. Hazard, and the prints were retouched by Miss Frances Wieser, also of the Geological Survey.

The types of the new species and subspecies and specimens representing nearly all the other species are deposited in the United States National Museum, and a named set of specimens representing topotypes and other species has been deposited with the Florida Geological Survey.

OCCURRENCE

The fossils herein described were obtained from a ditch along the Tamiami Trail, 42 miles west of Miami, Fla. (east side of sec. 25, T. 54 S., R. 34 E.), half a mile to one mile west of the test well of the Miami Oil & Natural Gas Co., and approximately on the line between Monroe and Dade[2] Counties. The specimens were collected by J. H. C. Martens (1928) and by Herman Gunter and G. M. Ponton (1929).

[1] Published with the permission of the Director of the United States Geological Survey.
[2] According to Florida Geol. Surv. Bull. 6, p. 10, Station No. 25, 1931, in Dade County.

Mr. Martens (then assistant geologist of the Florida Geological Survey) was at the locality while the shovel was working, and the section described by him, with a slight rearrangement, is as follows:

	Feet
3. Unconsolidated sand	2
2. Hard yellow limestone, containing many *Chione cancellata*	3
1. Unconsolidated medium-coarse sand with numerous shells; above water	1

Mr. Martens observed that only 1 foot of the lower bed was above water, but understood that the shovel was taking similar material at a depth of 6 feet below water level.

All the species listed in this paper are believed to have come from this lowest bed, ranging in a vertical distance from 5 to 12 feet below the surface. The following table gives the species collected, with their relative occurrence and geologic ranges:

Species	Occurrence[1]	Miocene	Pliocene	Recent
Acteocina sp. (corroded)	r			
Bulla sp. cf. *B. solida* Gmelin	r			
Myurella sp. cf. *M. binodosa* Mansfield (fragments)	r	(?)	(?)	(?)
Conus adversarius Conrad	r	x	x	
Cymatosyrinx lunata (H. C. Lea)	r	x	x	
Olivella tamiamiënsis, new species	r			
Olivella juspidea gladeënsis, new subspecies	c			
Marginella denticulata Conrad	r	x	x	x
Marginella sp. (corroded)	r			
Mitromorpha gunteri, new species	r			
Busycon sp. (corroded)	r			
Pyramidella sp.				
Trivia sp. cf. *T. pediculus* Linnaeus	r			
Cypraea carolinensis floridana, new subspecies	c			
Caecum floridanum cf. var. *compactum* Dall	r			
Caecum cooperi S. Smith	r	x	x	x
Vermetus varians d'Orbigny	r	(?)	x	x
Turritella pontoni, new species	a			
Turritella cookei gladeënsis, new subspecies	a			
Crepidula fornicata var. *cymbaeformis* Conrad	r			
Natica canrena (Linnaeus) Mörch	r	x	x	x
Polinices (*Neverita*) *duplicatus* (Say)	r	x	x	x
Tegula (*Omphalius*) *exoleta* (Conrad)? (corroded)	r			
Liotia? sp. (young)				
Fissuridea alternata Say? (broken)	r			
Nucula proxima Say	c	x	x	x
Glycymeris lloydsmithi floridana, new subspecies	r			
Arca (*Anadara*) *lienosa* Say	r	x	x	
Arca (*Cunearca*) *scalaris Conrad*, grading toward *scalarina* Heilprin	r	x		
Barbatia (*Plagiarca*) *candida* Gmelin, new subspecies?	r	x	(?)	
Ostrea sculpturata Conrad	r	x	x	

[1] a=abundant; c=common; r=rare.

Species	Occurrence	Miocene	Pliocene	Recent
Crassinella dupliniana Dall	r	x	x	
Cardita (*Carditamera*) *arata* Conrad	c	x	x	
Cardita (*Carditamera*) *tamiamiënsis*, new species	r			
Venericardia (*Pleuromeris*) *perplana gladeënsis*, new subspecies	r			
Venericarda (*Pleuromeris*) *tridentata decemcostata* Conrad	c	x	x	
Chama sp. cf. *C. congregata* Conrad	r			
Phacoides (*Here*) *pensylvanicus* (Linnaeus) var	c			
Phacoides (*Pseudomiltha*) *anodonta* (Say)	c	x	x	
Phacoides (*Cardilucina*) *trisulcatus* (Conrad)	c	x	x	x
Divaricella sp. (broken)	r			
Diplodonta acclinis (Conrad)	a	x	x	
Bornia sp	r			
Cardium (*Trachycardium*) *evergladeënsis*, new species	r			
Transennella carolinensis Dall	a	x	x	
Macrocallista nimbosa (Solander)	c	x	x	x
Venus campechiensis Gmelin	r	x	x	x
Gemma trigona Dall	a	x	x	
Parastarte martensi, new species	c			
Tellina sp. (young)				
Tagelus gibbus (Spengler) var.?	r			
Donax sp. (fragments)				
Spisula incrassata (Conrad)	a	x		
Corbula barrattiana Adams var	r	x	x	
Cadulus quadridentatus Dall?	r			

CONDITIONS OF DEPOSITION AND NATURE OF FAUNA

The matrix adhering to the outside of the shells and inclosed within them consists of beachlike, medium coarse, rounded, clear quartz grains, indicating a close-shoreline deposit.

The number of species of gastropods and pelecypods with their respective numbers of individuals are fairly well balanced; 25 species of gastropods and 30 species of pelecypods are present.

Some of the shells attained a large size, as *Olivella tamiamiënsis*, new species, *Olivella juspidea gladeënsis*, new subspecies, *Cardita arata* Conrad, *Cardita tamiamiënsis*, new species, and *Venericardia tridentata decemcostata* Conrad.

RELATION OF THE FAUNA TO A NEAR-BY FAUNA

A collection of fossils obtained along the Tamiami Trail, in Monroe County (sec. 13, T. 54 S., R. 32 E), 9 miles west of Pinecrest (Station 1/1179), were referred to the Pliocene.[2]

This locality is about 13 miles west of that where the fossils were obtained for this paper. The white or light-gray limestone in which the fossils at Station 1/1179 were found was thrown out of shallow ditches to form the roadbed of the Tamiami Trail and carries many individuals of *Ostrea*, *Pecten*, *Spondylus*, and casts of other genera—a fauna unlike that found in the sand to the east. It appears quite probable that the bed at Station 1/1179 either is represented by the 3-foot bed in the section 42 miles west of Miami or is a little older and that the underlying sand in the section is older than the limestone bed at Station 1/1179.

SUGGESTED AGE OF THE FAUNA

The fauna is tentatively placed in the upper Miocene, although it may represent a Miocene-Pliocene transition or a Pliocene fauna. The relative stratigraphic position of the sand in which the fossils occur has not been fully determined with respect to distant deposits.

The species that indicate a Miocene age rather than a later are as follows: *Cypraea carolinensis floridana*, new subspecies (*C. carolinensis* Conrad appears to be confined to the upper Miocene); *Turritella cookei gladeënsis*, new subspecies (*T. cookei* Mansfield and subspecies occur in the upper Miocene of western Florida); *Arca scalaris* Conrad var. (*A. scalaris* Conrad appears to be confined to the upper Miocene); and *Spisula incrassata* (Conrad), a Miocene species.

The species that indicate a Pliocene age are: *Vermetus varians* d'Orbigny; *Macrocallista nimbosa* (Solander), a species more characteristic of the Pliocene but occurring in the upper Miocene 3 miles southeast of Lumberton, S. C.; *Phacoides pensylvanicus* (Linnaeus) var. (a lower and thinner shell than typical). *P. pensylvanicus* (typical) appears to begin in the Pliocene.

DESCRIPTIONS OF NEW SPECIES

OLIVELLA TAMIAMIËNSIS, new species

PLATE 1, FIGURE 3

Description.—Shell large, solid, acuminate at posterior end, and consists of 7 whorls. Five early whorls, measuring 2.5 mm. in alti-

[2] Cooke, C. W., and Mossom, Stuart, Geology of Florida, 20th Ann. Rep. Florida Geol. Surv., p. 156, 1929.

tude, are broadly conical in outline. Following whorl much larger than preceding and strongly inflated. Body whorl large and subcylindrical in outline. Nucleus consists of one smooth, rounded, porcelaneous, terminally flattened whorl. Suture of postnuclear whorls distinct and channeled. Aperture about half the length of shell. Margins of outer lip broken. A heavy wash of callus lies on the inner lip and extends upward on the body whorl nearly to the suture. Columella, within, provided with one fold situated at its lower border, behind which is a shallow depression. No lirations are visible on the inner lip callus.

Dimensions.—Holotype (U.S.N.M. No. 371331) measures: Altitude, 24 mm.; diameter, 10 mm.; length of aperture, 12 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

The material at hand consists of two specimens.

The shell of the new species compares in size with the Recent species *Olivella rotunda* Dall, but *O. tamiamiënsis* has a more produced and acuminate spire and lacks the lirations on the inner lip.

OLIVELLA JUSPIDEA GLADEËNSIS, new subspecies

PLATE 1, FIGURE 1

Description.—Shell large, solid with a moderately acuminate spire, and consists of 6 or 7 whorls. Suture deep, narrow, and channeled. Spire broadly conical; body whorl subcylindrical in outline. Inner lip and face of body whorl provided with a heavy wash of callus. Aperture narrow above and rather wide below. Inner lip callus, except upper area, marked with 18 to 20 lirations.

Dimensions.—Holotype (U.S.N.M. No. 371332) measures: Altitude, 23.5 mm.; diameter, 9 mm.; length of aperture, 15 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

This subspecies differs from the Recent species *Olivella juspidea* Gmelin in having a stouter shell with a more acuminate spire and longer body whorl.

MITROMORPHA GUNTERI, new species

PLATE 2, FIGURE 6

Description.—Shell very small, slender, subfusiform, and consists of 1½ nuclear and 4 postnuclear whorls. Suture inconspicuous and shallowly depressed. Apical half turn minute; following turn much larger, smooth, and inflated. Postnuclear spire whorls sculptured with 3 raised, blunt, equisized spirals. The spirals on the two posterior whorls are weakly beaded, while the following spirals are nearly smooth. The space between the posterior and the following

spiral is a little wider than that between the medial and the anterior spiral. Body whorl with 11 spirals, which slightly decrease in strength anteriorly. A very weak spiral lies adjacent to and behind the suture. Very weak axial growth lines intercalate the spirals. Aperture rather narrow; margin of outer lip broken off; within marked with weak entering lirations. Columella bearing two oblique folds, the posterior being much the stronger and situated near the middle of the aperture. The anterior plication is situated near the lower border of the columella.

Dimensions.—Holotype (U.S.N.M. No. 371346) measures: Length, 4.2 mm.; diameter, 1.7 mm.; length of aperture, 1.7 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

The material consists of one nearly perfect specimen—the holotype—and a fragment of another shell.

The new species differs from *Mitromorpha pygmaea* Dall, a Pliocene species, in having a more slender shell, which is sculptured on the spire whorls with three spirals instead of four. *Mitromorpha mitrodita* Gardner and Aldrich, a species occurring in the Duplin marl, N. C., has axial costae and four spirals on the spiral whorls.

CYPRAEA CAROLINENSIS FLORIDANA, new subspecies

PLATE 1, FIGURES 2, 6, 7

Description.—Shell rather large, solid, and subelliptical in outline. Dorsal area well rounded; ventral area slightly rounded. Aperture wide, more expanded below than above. Posterior commissure wide and deep. Teeth strongly developed on both lips. The holotype has 24 teeth on the outer lip and 17 on the inner. The number of teeth on the outer lip of paratype specimens ranges from 21 to 24, and on the inner lip, 16 to 18.

Dimensions.—Holotype (U.S.N.M. No. 371333) measures: Length, 80 mm.; diameter, 48 mm.; dorso-ventral diameter, 34.5 mm. Figured paratype measures: Length, 69 mm.; diameter, 45.5 mm.; dorso-ventral diameter, 23 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

The subspecies differs from *Cypraea carolinensis* Conrad in having a more rounded ventral area. One specimen collected by the writer from the Duplin marl at Station 11831, 5 miles west of Faison, Sampson County, N. C., agrees in detail with the Florida specimens.

TURRITELLA PONTONI, new species

PLATE 2, FIGURES 4, 5, 7

Description.—Shell rather large, solid, acute, having an apical angle of 19° and consisting of 11 whorls on the holotype. Whorls

are more expanded at the anterior end than posterior, and wind against the base of the preceding whorl. Earliest 1½ turns smooth and inflated; the following 4 to 5 turns are medially carinate; and the following turns are marked by two spiral carinae, which are more prominent on the earlier than later whorls. The lower carina marginates the precipitous base and gradually increases in strength in ascending the whorl. Aside from the carinae, there are 12 to 16 moderately strong, subrounded primary spiral threads on each whorl, which are more closely spaced on the early whorls than on the later whorls. Two to three threadlets intercalate the primary spirals. Aperture subovate in outline.

Dimensions.—Holotype (U. S. N. M. No. 371335) measures: Altitude, 66 mm.; greatest diameter, 21 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

Some of the broken specimens represent larger shells than the holotype; one of these measures 33 mm. in diameter.

The new species is named for Gerald M. Ponton, of the Florida Geological Survey.

It is nearly related to *Turritella gatunensis* Toula but differs from the latter in having a greater apical angle and weaker and more rounded spirals on the posterior slope.

Turritella alcida Dall, a species occurring in the Oak Grove sand of the Alum Bluff group, is similar in outline and in sculpture to *T. pontoni* but differs from it in having wider-spaced carinae and more closely spaced spirals.

TURRITELLA COOKEI GLADEËNSIS, new subspecies

PLATE 2, FIGURES 1, 2, 3

Description.—Shell rather large, acute, the apical angle being about 18°, and consists of 14 whorls on the broken holotype, probably originally about 20 whorls. Suture grooved but not deeply impressed. Anterior one to two whorls on some specimens rounded in outline and much more expanded than preceding. Apical whorl rather small, smooth, and nearly rounded in outline; following 8 to 10 whorls medially depressed and ornamented mainly by two crenulated spirals, the anterior being the stronger and first to originate. On the later whorls there are 6 spirals. In ascending the whorl, the first and third spirals are weak and about equal in strength; the second and fourth are a little stronger; the fifth is the strongest spiral and forms the periphery of the whorl; and the basal spiral is weaker than the preceding and lies closely against the suture. All the spirals except the basal one are crenulated. The surface of the shell is marked by spiral threadlets, which overrun the spirals and interspaces.

Dimensions.—Holotype (U.S.N.M. No. 371337) measures: Altitude 58 mm.; greatest diameter, 17 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

Turritella cookei gladeënsis is most closely allied to *T. c. harveyensis* Mansfield, an upper Miocene subspecies, differing mainly from the latter in having a more strongly developed peripheral spiral. *T. burdenii* (Tuomey and Holmes), an upper Miocene species, also is closely allied to *gladeënsis*, but the former also has a less strongly developed peripheral spiral.

GLYCYMERIS LLOYDSMITHI FLORIDANA, new subspecies

PLATE 3, FIGURES 4, 5

Description.—Shell small, subovate, slightly inequilateral, and rather strongly inflated. Beak high, narrow, and protruding. Middle of disk well rounded; slopes subtruncate, anterior more truncate than posterior. Posterior margin more rounded than anterior; basal margin narrowly rounded. Sculpture of 31 subrounded to nearly flat, moderately wide, closely set ribs, separated by narrow incised spaces. A few ribs behind the posterior shoulder have a low, medial, raised, radial thread. Cardinal area 1.9 mm. wide and sculptured with 5 chevron-shaped ligamental grooves. There are 11 arched teeth in each series behind and in front of the beak. The first posterior tooth, situated beneath the beak, is wider than the others and shallowly corrugated. The teeth in the middle of each series are stronger than those at either end. The lower inside margin shows 20 doubled prominences, separated by valleys equal in width to the prominences.

Dimensions.—Holotype, left valve (U.S.N.M. No. 371339) measures: Length, 18 mm.; altitude, 19 mm.; semidiameter, 6 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

The shell here described appears to be very closely allied to *Glycymeris lloydsmithi* Pilsbry and Brown, a species obtained from the Miocene in the neighborhood of Cartagena, Colombia. The cardinal area on *G. lloydsmithi* is much narrower than that of *G. l. floridana* and has a nearly smooth surface. Dr. A. A. Olsson[3] records the occurrence of *G. lloydsmithi* at three localities "in the Gatun stage in Costa Rica." I have not seen specimens from these localities, but the illustrations indicate a somewhat more oblique shell than that of *floridana*. The new subspecies more closely resembles *G. subovata* (Say) in sculpture and *G. pectinata* (Gmelin) in outline.

There are only two left valves of the new subspecies at hand, one of which constitutes the holotype.

[3] Olsson, A. A., Bull. Amer. Pal., vol. 9, p. 353, pl. 28, figs. 8–10, 1922.

CARDITA (CARDITAMERA) TAMIAMIËNSIS, new species

PLATE 3, FIGURES 1, 2, 3

Description.—Shell very large, heavy, strongly inflated, and subquadrate in outline. Middle of shell and anterior side well rounded in outline; posterior side steeply descending. Sculpture of 17 ribs, thin and high over the umbonal region and thick and heavy over the ventral area. The ribs over the middle and anterior side of the shell are ornamented with thin, erect, transverse lamellae and over the posterior shoulder and posterior side by scabrous lamellae. The lateral tooth is strong. The lower inside margin is marked with wide crenulations.

Dimensions.—Larger cotype, left valve (U. S. N. M. No. 371341) measures: Length, 57 mm.; altitude, 42 mm.; semidiameter, 20 mm. Smaller cotype, length, 46 mm.; altitude, 30 mm.; semidiameter, 13 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

This species is very similar in outline and convexity to *Cardita* (*Carditamera*) *floridana* Conrad, described from the Recent fauna of the coast of Florida, but in size it is twice as large as the largest specimen I have seen of the Recent species. The ribs over the umbonal area of the new species are much higher and thinner than those on the Recent species and lack the strong beaded ornamentation. *C.* (*C.*) *tamiamiënsis* appears to be an ancestral form of *C. floridana.*

Only three left valves of the new species are at hand.

VENERICARDIA (PLEUROMERIS) PERPLANA GLADEËNSIS, new subspecies

PLATE 4, FIGURES 2, 5

Description.—Shell very small, moderately solid, rather low, obliquely subovate, inequilateral, the anterior side being much longer. Anterior side of disk much higher than posterior side. Sculpture of 15 closely spaced ribs, more distinct and very weakly granulated over upper half of disk and indistinct over lower half. Reflected concentric lamellae ornament the vertical half of the disk. Lunule and escutcheon well defined, smooth, and lanceolate. Internal margin rather coarsely crenulated.

Dimensions.—Holotype, left valve (U.S.N.M. No. 371342), measures: Length, 3 mm.; altitude, 3.2 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

The material consists of three left valves, one of which constitutes the holotype.

V. (*P.*) *perplana gladeënsis* is most closely allied to *V.* (*P.*) *p. abbreviata* (Conrad), a form described from the upper Miocene at Wil-

mington, N. C., but its shell is narrower, is more elevated over the anterior side, and is sculptured with less distinct radials.

CARDIUM (TRACHYCARDIUM) EVERGLADEËNSIS, new species

PLATE 4, FIGURES 1, 3, 9

Description.—Shell rather small, solid, subquadrate, slightly oblique, and moderately inflated. Middle of shell and anterior side rounded; posterior side more steeply declining. Anterior margin broadly rounded, ventral margin narrowly rounded, posterior margin nearly straight. Sculpture of 29 to 31 (on the holotype 31) nearly flat, narrow, high ribs, which are separated by moderately narrow spaces over the middle of the disk and more closely spaced over the sides. Crest of ribs ornamented with thin, nearly erect, marginally reflected funnel-shaped structures, which are more closely spaced on the anterior side than on posterior. The surfaces of the ribs are corroded over the middle of the shell and only the basal parts are revealed. A patch of callus covers the inside of the shell.

Dimensions.—Holotype, left valve (U.S.N.M. No. 371343), measures: Length, 34 mm.; altitude, 39 mm.; semidiameter, 15 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

Cardium (*Trachycardium*) *everglade*ë*nsis* most closely resembles *C. isocardia* Linnaeus in outline but differs from it in having a more quadrate shell. The character of the sculpture on the ribs is also different.

The material at hand consists of only two left valves, one of which constitutes the holotype.

PARASTARTE MARTENSI, new species

PLATE 4, FIGURES 4, 6, 7, 8

Description.—Shell very small, trigonal, moderately convex, slightly inequilateral and oblique. Beaks rather low, pointed, and anteriorly directed. Back of valves gently rounded, sides precipitous. Posterior margin very broadly rounded and longer than anterior; anterior margin nearly straight except at lower part, where it curves outward; ventral margin broadly rounded. Lunule large, lanceolate, bounded by distinct lines, and longitudinally crossed by fine threads. External sculpture of moderately fine, slightly raised concentric lamellae. Hinge with three cardinals, the middle tooth in each valve being the strongest. Posterior lateral margin of right valve and anterior lateral margin of left valve sulcated to receive the edge of the opposite valve. Inside ventral margin not crenulated.

Dimensions.—Cotypes (U.S.N.M. No. 371344) measure: Right valve, length, 2.7 mm.; height, 2.7 mm. Left valve, length, 2.7 mm.; height, 2.7 mm.

Type locality.—Tamiami Trail, 42 miles west of Miami, Fla.

Parastarte martensi appears to be more closely allied to the forms that have been referred to the genus *Parastarte* than to those referred to the genus *Gemma.* The concentric sculpture suggests the genus *Gemma*, but the other features are more like those of *Parastarte.*

EXPLANATION OF PLATES

(Figures represent the natural size of the specimens unless otherwise indicated on the plates)

PLATE 1

FIGURE 1. *Olivella juspidea gladeënsis*, new subspecies. Holotype.

2, 6, 7. *Cypraea carolinensis floridana*, new subspecies: 2, Back view of holotype; 6, front view of paratype (U.S.N.M. No. 371334); 7, front view of holotype.

3. *Olivella tamiamiënsis*, new species. Holotype.

4, 5. *Gemma?* new species? (U. S. N. M. No. 371345). A unique specimen that is too small to determine the genus.

PLATE 2

FIGURES 1, 2, 3. *Turritella cookei gladeënsis*, new subspecies: 1, Holotype; 2, 3, paratypes (U. S. N. M. No. 371338).

4, 5, 7. *Turritella pontoni*, new species: 4, 5, Paratypes (U.S.N.M. No. 371336); 7, holotype.

6. *Mitromorpha gunteri*, new species. Holotype.

PLATE 3

FIGURES 1, 2, 3. *Cardita* (*Carditamera*) *tamiamiënsis*, new species. Cotypes. 1, Exterior of smaller valve; 2, 3, interior and exterior of larger valve.

4, 5. *Glycymeris lloydsmithi floridana*, new subspecies. Holotype, interior and exterior of same valve.

6. *Cardita* (*Carditamera*) *arata* Conrad. Exterior of left valve of a large specimen, U.S.N.M. No. 371340.

PLATE 4

FIGURES 1, 3, 9. *Cardium* (*Trachycardium*) *evergladeënsis*, new species. Holotype. 1, 3, Interior and exterior of same valve; 9, character of ornamentation on anterior side of outside.

2, 5. *Venericardia* (*Pleuromeris*) *perplana gladeënsis*, new subspecies. Holotype, exterior and interior of same valve.

4, 6, 7, 8. *Parastarte mariensi*, new species. Cotypes. 4, 6, Same valve; 7, 8, same valve.

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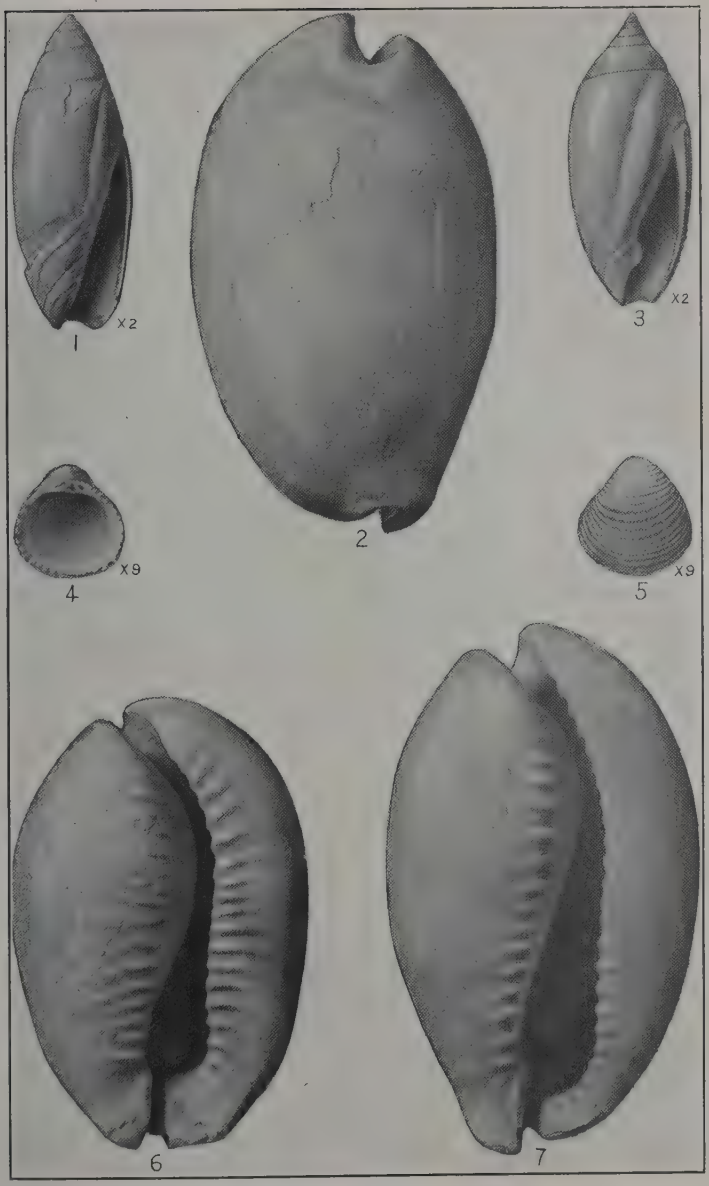
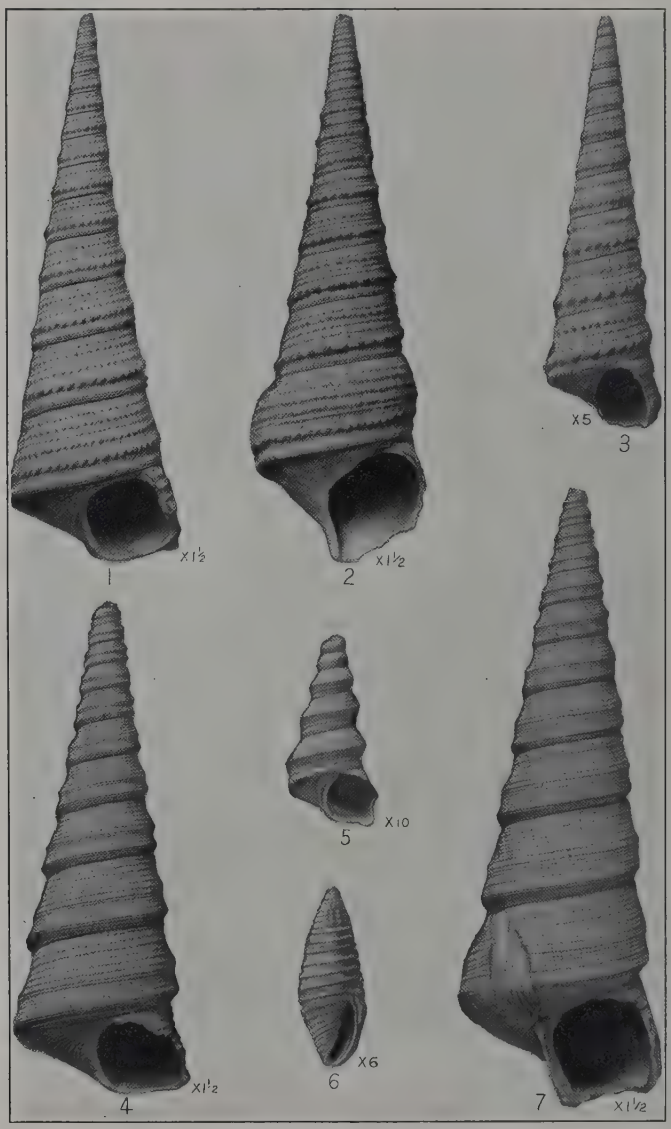


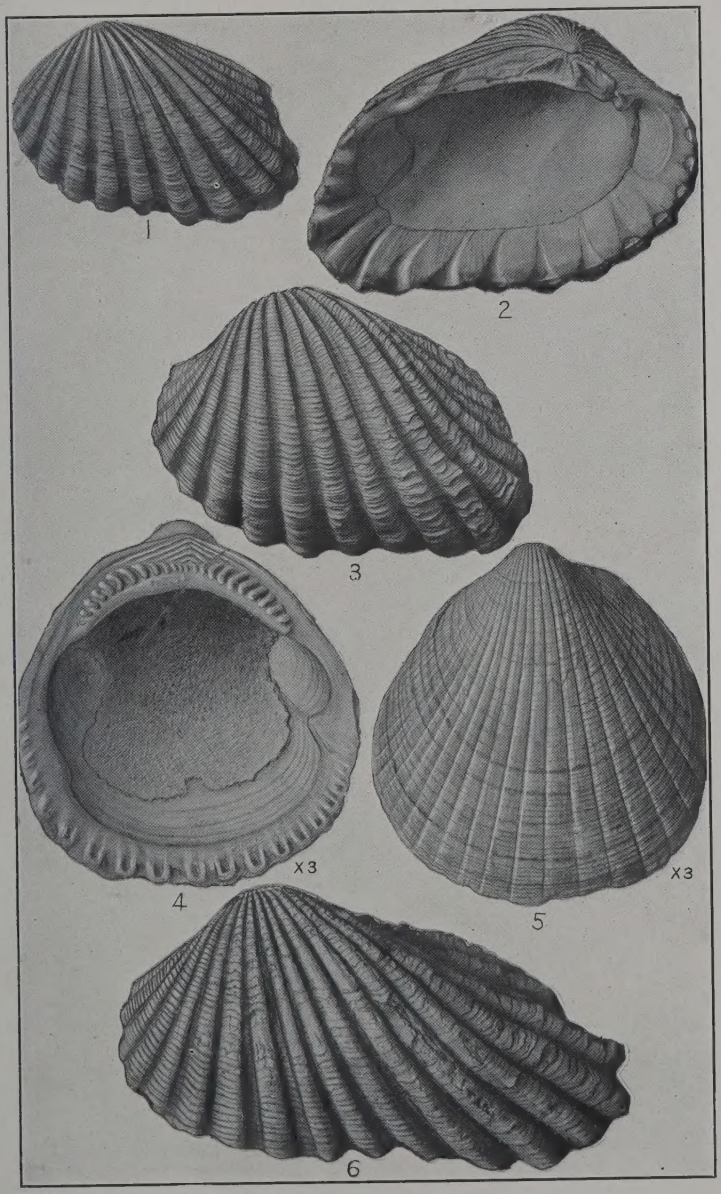
SPECIES OF OLIVELLA, CYPRAEA, AND GEMMA (?)

FOR EXPLANATION OF PLATE SEE PAGE 12.



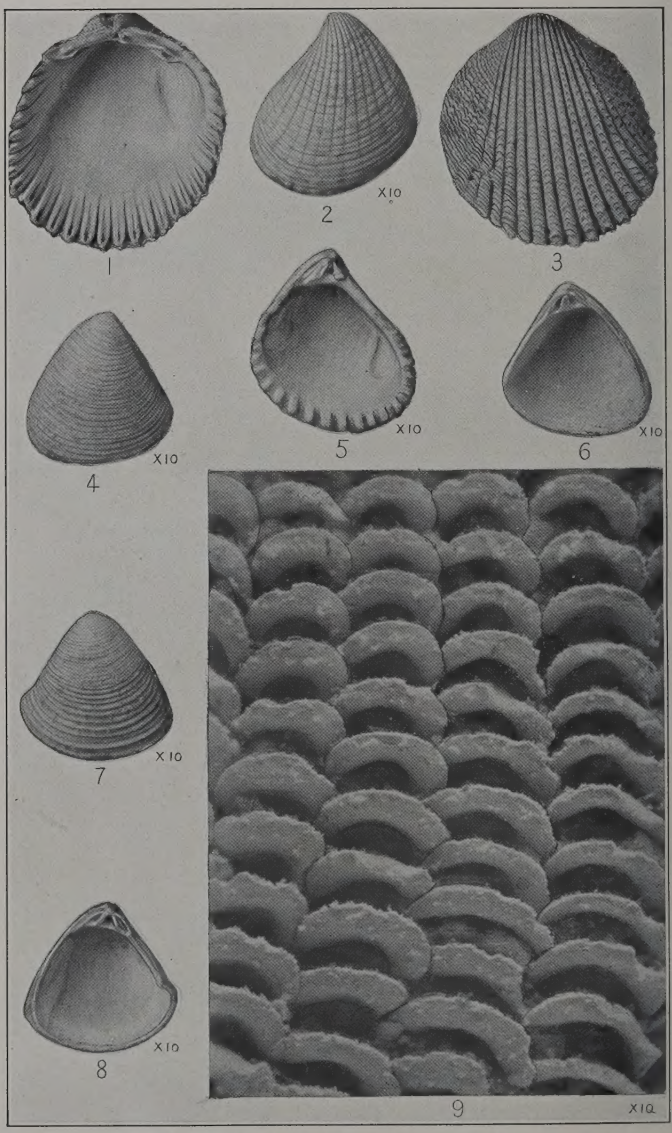
SPECIES OF TURRITELLA AND MITROMORPHA

FOR EXPLANATION OF PLATE SEE PAGE 12.



SPECIES OF CARDITA AND GLYCYMERIS

FOR EXPLANATION OF PLATE SEE PAGE 12.



SPECIES OF CARDIUM, VENERICARDIA, AND PARASTARTE

FOR EXPLANATION OF PLATE SEE PAGE 12.